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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/560,861

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Richard O'Dell

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2089

23416

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07/14/2009

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EXAMINER

LISTVOYB, GREGORY

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

07/14/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/560,861	<b>Applicant(s)</b> O'DELL ET AL.	
	<b>Examiner</b> GREGORY LISTVOYB	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-19 and 25 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 15-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7-14 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

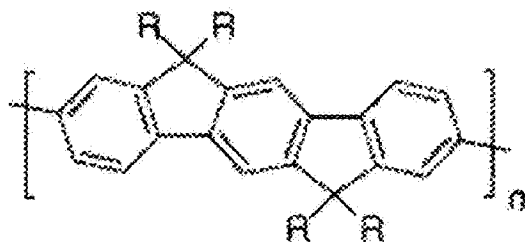
### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

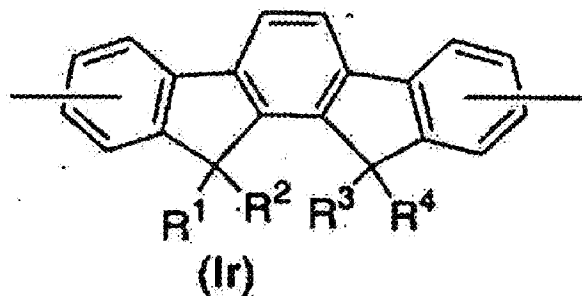
Claims 1- 3, 5, 7-14 and newly added claim 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Setayesh et al (Bridging the Gap between Polyfluorene and Ladder-Poly-p- phenylene: Synthesis and Characterization of Poly-2,8-indenofluorene, *Macromolecules*, 2000, 33, 2016-2020), herein Setayesh in combination with Reisch (Dissertation, Oligo- und Poly(indenofluorene)..., Mainz, 2000, pp. 27 and 115) and Inbasekaran (US 5777070) herein Inbasekaran and evidences by Kim (Assemblies of conjugated polymers. Intermolecular and intramolecular effects on the photophysical properties of conjugated polymers, *Pure Appl. Chem.*, Vol. 74, No. 11, pp. 2031-2044, 2002) herein Kim (all cited in the previous Office Action).

Setayesh discloses a Poly-2,8-indenofluorene of the following structure (8a) (see page 2017) (structure I):



**8 a:** R = octyl  
**b:** R = ethylhexyl

which is trans isomer compare to cis- polyindeno[fluorene, claimed in Claim 1  
(structure II):



Both Setayesh and the Applicant use their polymers in light emitting devices.

In reference to Claims 9-12, Setayesh discloses a method of synthesis, identical to one of the Application examined (see reaction Scheme 2).

It is noted that the Applicant directly compares Sic and Trans structures in the Specification (see Table 1). The data from Table 1 reveal that there is no direct evidence that trans structures (Examples 6-9) have inferior performance compare to cis-

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structure (Example 5) in the following: ClEx (all the data are comparable), ClEy (Polymer 5 comparable with Polymer 7), Half life (trans Polymer 6 is better than Polymer 5), Color shift, Delta V and Burning (random data, not dependent on cis and trans isomers).

The starting monomer for polyindenofluorene is trans-indenofluorene (see Scheme 2), analogous to one claimed in Claims 8-10. However, cis- indenofluorene, used in the Application is also known in the art.

Reisch uses cis- indenofluorene for preparing family of polymers for light emitting devices (see page 27 and 115).

Kim evidences that introducing of cis linkages in conjugated polymers used in light emitting devices leads to high emission yield (see page 2040).

Therefore, it would have been obvious to a person of ordinary skills in the art to use Reisch's cis- indenofluorene monomer as a starting material in Setayesh's synthesis in order to achieve high emission yield.

Both Setayesh and Reisch fail to disclose a second repeat unit in their polymers.

Inbasekaran teaches a conjugated polymer for light emitting diodes (see Column 8, line 20) having conjugated 9, 9 di-n-octylfluorene and naphthalene units in its structure (see Example 3).

Inbasekaran teaches Halogen and Boron-based leaving groups (see Column 3, line 5 and Example 3) used together and Palladium catalyst used with a base (see Column 4, line 30 and Example 3). Note that Inbasekaran uses his polymerization system to produce copolymers. Setayesh, Inbasekaran and Application methods are obvious variants of classical Yamamoto's synthesis (admitted prior art, see Spec page 6).

As evidences by Kim, strong intermolecular interferences deteriorate emission properties of conjugated polymers (see page 2040). Introducing of bulky Naphthalene group decreases the above interaction, since it disturbing chain packing.

Therefore, it would have been obvious to a person of ordinary skills in the art to introduce bulky Naphthalene group to modified Setayesh's polymer in order to enhance emission properties of conjugated polymer.

### ***Response to Arguments***

Applicant's arguments filed on 4/14/2009 have been fully considered but they are not persuasive.

Applicant submits that "Reisch on page 115 only discloses a cis-indenofluorene molecule. This molecule is not a monomer and therefore, the applicant cannot see any disclosure how a polymer can be produced starting from this molecule. Even if there would be a disclosure within Reisch how to produce polymers, the result would be again homopolymers".

Examiner disagrees. Reisch teaches polymers based on the above monomers. The title of the Dissertation is "Oligo and Poly(indenofluorenes)- new materials for energy-pas applications".

On page 19 Reisch teaches monomers for the Oligo and Poly(indenofluorenes).

On page 115 Reisch teaches a mechanism where at least trimers and pentamers formed.

Applicant submits that ;Kim's evidence not relevant to the Application examined.

Examiner disagrees. Kim evidences that strong intermolecular interferences deteriorate emission properties of conjugated polymers (see page 2040). Introducing of bulky Naphthalene group decreases the above interaction, since it disturbing chain packing. Kim used in the Rejection to support modification of Setayesh's polymer in order to enhance emission properties of conjugated polymer.

Applicant disagrees with Examiner's analysis of Table 1 of the Specification. Specifically, Applicant submits that Polymers 6 to 9 have different properties due to the

fact that the trans-indenofluorene units contain different substituents. Therefore these four materials are not directly comparable, while Polymers 5 and 6 are comparable.

However, it is clear, for instance, that such parameter as % burning depends not only on cis- trans isomerisation, but on the nature of alkyl radical (bulky alkyl is favorable). In contrary, color shift declines with decreasing of Alkyl content. Trans-containing polymer (Entry 6) shows better Half life from 800 cd/m<sup>2</sup>) (140h vs 120h for cis-containing polymer). Another trans-containing copolymer (see Entry 9) shows better data on %burning (1%vs 3% for cis-copolymer). In other words, data of Table 1 show that isomerisation is just one of a few parameters, determining the properties of the polymer.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James J. Seidleck/

Supervisory Patent Examiner, Art Unit 1796

GL